

A Motionless Camera

Highlighting spinoff examples in the field of computer technology is a novel electronic imaging system

Omniview™ is a camera system, a very different camera system. It can see in more than one direction and provide as many as four views simultaneously, each with its own pan, tilt, rotation and magnification. And for all that it has no moving parts.

Developed by TeleRobotics International, Inc. (TRI), Knoxville, Tennessee under a NASA Small Business Innovation Research contract, *Omniview* was introduced to the commercial market in 1993 and in the same year it won an R&D 100 Award, presented by *R&D Magazine* as one of the most technologically significant products of the year.

The camera was intended primarily for NASA use as a viewer for space teleoperation of robotic systems, where size, weight and power consumption are at a premium, and reliability and fast response are among the most important factors. Therefore, *Omniview* was developed to eliminate the pointing mechanisms and mechanical links normally required for rotating, panning and tilting the camera; all these functions are handled electronically. The result is a motionless, noiseless, exceptionally versatile camera whose capabilities can be advantageously employed in a broad variety of applications.

Omniview's image transformation electronics produce a real-time image from anywhere within a hemispherical field, such as the circular image provided by a fisheye lens with a 180 degree field of view. A video image viewed through a fisheye lens would be distorted, but *Omniview* automatically removes any lens distortion from the image and presents a corrected "flat" view on a monitor.

Among the key elements of the system are a high resolution CCD (charge coupled device); image correction circuitry governed by two TeleRobotics devel-

Originally developed as a viewing device for guiding space robots, the **Omniview** camera (on tripod) can photograph up to four objects simultaneously without moving its lens; the rotating, panning and tilting functions are handled electronically.





*Surveillance of an apartment building lobby is one of many **Omniview** applications. A video image viewed through a wide angle fisheye lens would be badly distorted as shown at left, but **Omniview** removes the distortion and presents a corrected "flat" view on the monitor; note the distortion of the staircase in the fisheye view and the corrected closeup below.*



oped mathematical equations; and a microcomputer for image processing. Because the digital transformation process will work with almost any type of camera, *Omniview* can be adapted to existing installations where cameras are already in place — for example, a building installation designed to allow a security officer to observe various parts of the building on a console. Four different cameras can be run through the same processor. Company literature describes the versatility of the system:

"With high resolution imaging devices, the *Omniview* system can provide a complete viewing solution that simultaneously replaces the functionality of multiple cameras, their pointing mechanisms, and their associated cabling and electronics. With infrared sensors, *Omniview* can also be used for night vision."

The system can be used in such applications as security and surveillance, teleconferencing, medical and industrial imaging, virtual reality, broadcast video, and in military operations such as observation missions by unmanned aerial vehicles.

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